University of Hawaii at Manoa

Environmental Center
Crawford 317 • 2550 Campus Road
Honolulu, Hawaii 96822
Telephone (808) 948-7361

February 14, 1990
RP:0120

Mr. William Paty
Commission on Water Resource Management
Division of Water Resource Management
Department of Land and Natural Resources
1151 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Paty:

Application for Stream Channel Alteration Permit
Makawao Stream Drainage Basin
Kailua, Koolaupoko, Oahu

The Environmental Center has conducted a review of the above referenced document with the assistance of Paul Ekern, hydrology; and Carolyn D. Cook, Environmental Center. Community Planning Inc. proposes to alter stream channels by the use of pipe culverts in three places to provide stream crossings for the golf carts and maintenance vehicles of the Royal Hawaiian Country Club's golf course.

One of the major causes of culvert failure is the piping, particularly where there is an overlying loose fill. Thus, the overlying fill above the culvert should be compacted to provide adequate strength when the flow exceeds the 10 year value and overtopping occurs.

The careful design of the antiseep collars on the culvert is a necessary precaution, especially important during flood flows when the fill becomes saturated. Has consideration been given to the use of hooded culverts to enhance the flow at intermediate stages? We enclose an example of antivortex pipe inlets and discharge of hooded-inlet pipe spillways for your reference.

Our reviewers were unable to assess several aspects of the proposed action due to insufficient detail in the documentation. For instance, has consideration been given to overflow spillway designs, grassed slopes, and maintenance of these slopes to adequately carry the overflow from a major storm? Are necessary measures for preventing vegetative blockage of the culvert entries included in the design? Has an estimate been made of the life of the ponds, including provisions for sediment removal to maintain storage capacity?

The acronyms, CRM and RCP, are used in the text without definition, making assessment of the design difficult for the uninitiated.

We thank you for the opportunity to comment on this Application for Stream Channel Alteration Permit.

Yours truly,

John T. Harrison
Environmental Coordinator

cc: OEQC
L. Stephen Lau
Paul Ekern
Carolyn D. Cook ✓

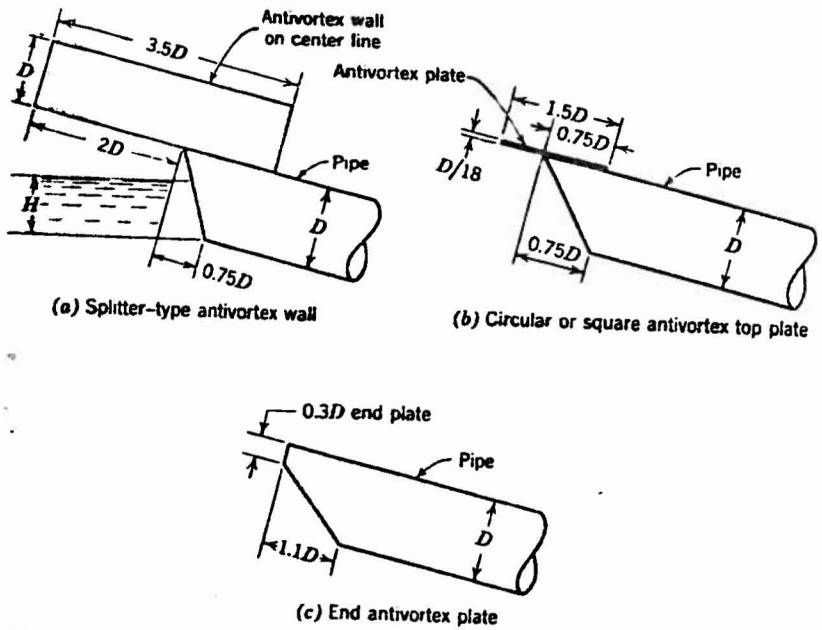

Fig. 11.19. Three types of antivortex pipe inlets. (Designs from Blaisdell and Donnelly, 1958, and Beasley and others, 1960.)

outlined in Section 11.5. When this type of flow equals the capacity of the conduit or conduit inlet section, the flow becomes proportional to the square root of the total head loss through the structure or the head on the conduit inlet.

Hood Inlets. For farm pond mechanical spillways and similar small structures the hood inlet has largely replaced the drop inlet entrance. For slopes up to 30 per cent the hood inlet when provided with a suitable antivortex device will cause the pipe to prime and flow full. Hood inlets shown in Fig. 11.19*a* and *b* have been developed by Blaisdell and Donnelly (1958). Beasley et al (1960) reported that model and field tests of a hood inlet with an end plate shown in 11.19*c* gave satisfactory performance although the entrance loss was somewhat higher than the other two. The discharge characteristics of these three inlets are shown in Fig. 11.20 for a pipe length of $110D$. For H/D less than 1, weir flow occurs, and up to H/D of about 1.4 the flow is rather erratic. At H/D of 1.4 the vortex is eliminated and pipe flow controls. The entrance coefficient for thin-wall pipe (ratios of wall thickness to pipe diameter below 0.04) is slightly higher than for heavier pipe.

The design capacity is determined from the pipe-flow equation as described for culverts. Entrance-loss coefficients are given in Appendix D. Although the approach conditions have little effect on spillway performance, the presence of the face of the dam will reduce somewhat the entrance loss coefficient. High velocities near the hood inlet may erode the dam, but such a hole is small and becomes stabilized in a short time. For example, Blaisdell and Donnelly (1958) report that for $Q/D^{5/2} = 15$ and the size of the bed material equal to $0.001D$, the scour hole diameter is only $6D$. Hood inlets are simple and easy to install and for small pipe diameters are much more economical than the reinforced concrete drop inlet. They are also available commercially.

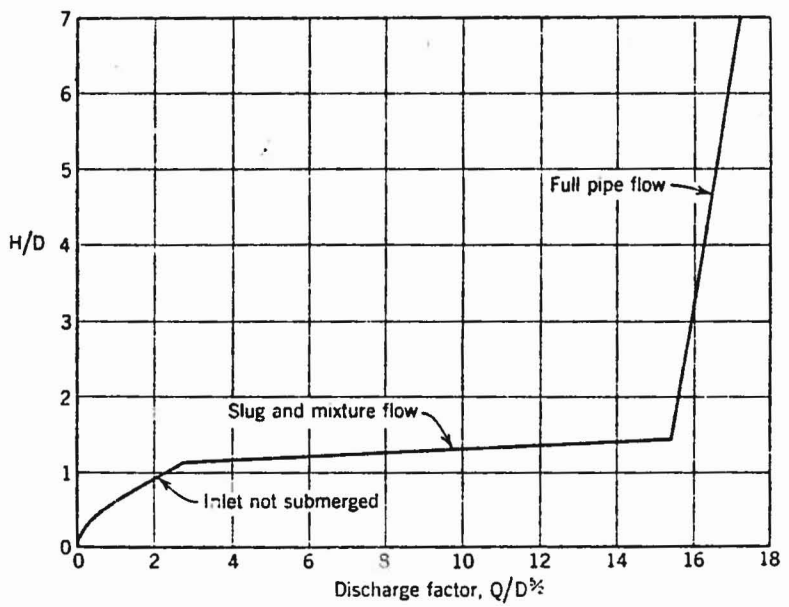

Fig. 11.20. Discharge of hooded-inlet pipe spillways. (Redrawn from Blaisdell and Donnelly, 1958.)